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INSTITUTIONAL PROVISION OF OPEN ACCESS IN UKRAINE

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The issues of organization of open access to scientific and educational information in Ukraine are considered. The examples of existing electronic archives are given. The expediency of creating a national repository of academic texts is shown. The proposals on the key elements of the future repository, its structure, content, interaction with the participants, partners and users, main tasks and functions are provided.

Keywords: open access, scientific information, repository, open science infrastructure.

The modern world becomes more and more digital. The management of production processes, administration, information dissemination, data exchange and interpersonal communication in tempo frettolato passes to the sphere of computer technology and the Internet. The infrastructure of the science also rapidly changes. Two decades ago, the libraries and the bookstores were the access to general and special information. Gradually, scientific, educational data and social communications began to shift to the Internet. The term "open access" has appeared. By "open access" its initiator and active supporter, that is BOAI - Budapest Open Access Initiative, envisages «free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than

those inseparable from gaining access to the internet itself» [1]. Wherein the only relevant limitation is the right of the author to the control over the integrity of his/her work, correct citation and acknowledgment.

The key elements of the openness system are open archives, electronic libraries and data warehouses, the repositories. As a rule, they operate on the basis of free licenses [2] and structured in such a way that the widest possible range of interested persons was provided with an access to knowledge, scientific developments and the data collected as a result of experiments or specially conducted observations.

The more complete in content, deep in the time cut, accessible and universal such a repository containing not any, but namely, the verified scientific information is, the more valuable and popular it will be. Another important factor is the nature of the archive arrangement, the policy regarding the collections kept in it, the search tools and the tools for the user's further working with the data.

In 2016, the European Union adopted a decision to open the results of all scientific research that was financed by budgetary funds for wide familiarization by 2020 [3]. In this regard, the Secretary of State of the Netherlands for Education, Culture and Science stated, "Research and innovation generate economic growth and more jobs and provide solutions to societal challenges. And that means a stronger Europe. To achieve that, Europe must be as attractive as possible for researchers and start-ups to locate here and for companies to invest. That calls for knowledge to be freely shared. The time for talking about open access is now past. With these agreements, we are going to achieve it in practice" [4].

Under the new rules, the results of research supported by public and public-private foundations will be mandatorily publicly available, unless there are justified reasons against this (the restrictions may be dictated by the requirements of respect for the intellectual property rights, security or confidentiality of information). Previously, the results of such research were available only directly to the institutional participants (university libraries and research institutes), as well as to the developers themselves.

The decision taken by the EU on open access to research results presupposes that the scientific publications will be placed in the institutional repositories. Moreover, if according to the established practice, the titles that do not provide the open access nevertheless allow the authors to post their own works in accessible ways with a slight delay (for example, 6

or 12 months after the publication), then, in accordance with the decision taken in the EU it is necessary that the documents became available at the time of the publication due to the placement in the institutional repository.

There are at least two outstanding examples of open archives in Ukraine. One of them is a unique constantly updated depository of the laws and regulations [5], the second one is one of the ten largest national libraries in the world with the large network resources [6].

We cannot also ignore such a universal scientific research data warehouse as the national fund for research and development work and defended dissertations whose functioning is provided by the State scientific institution "Ukrainian Institute of Scientific, Technical and Economic Information" [7]. This fund is a national treasure and contains about 200 thousand works and is annually refilled by 15-18 thousand units.

Institutional repositories of the native higher education institutions, in particular Sumy State University [8], Lviv Polytechnic National University [9], National Mining University [10], O. M. Beketov National University of Urban Economy in Kharkiv [11] and others have massive archives and extremely valuable work experience. However, our study of the availability of electronic archives, depositories and repositories, as well as the study of the capabilities of national scientific libraries does not provide grounds for optimism.

According to Webometrix data there are 54 repositories in Ukraine [12], Elibukr counts 36 of them [13], Vernadsky National Library of Ukraine – 50 [14], the Open Doar service publishes the information about 70 [15], and the registry of ROAR open source repositories points to 92 such depositories [16].Thus, from 8 to 20% of higher education institutions[1] implement in their activities the concept of open access using for this purpose their own repositories of scientific works. Some other higher education institutions have electronic libraries, but the availability of their archives and the possibility to read the full-text versions is usually limited. A more complex situation is with the scientific institutions archives. Of 127 scientific institutions that we surveyed only 13% support digital libraries and 2% have their own open access repositories.

[1]   Academies, universities, institutes the data on which are presented in the register of higher education institutions on the official website of the Ministry of Education and Science of Ukraine: http://mon.gov.ua/edebo/vidkriti-dani/reestr-vishhix-navchalnix-zakladiv.html

Thus, there are libraries, repositories, storages and other systems for the accumulation and dissemination of information in the country. But their data is stored by various institutional participants, is not integrated into a unified system, accumulated and systematized according to various principles and technologies and are limited in accessibility. The interface, the search capabilities of such resources, as well as the verification of data are different. This creates significant difficulties in accessing scientific information and its use, reduces the efficiency of these systems.

Therefore, there is a need to develop and implement a new comprehensive integrated system for storing and disseminating scientific information free of the above shortcomings which will embody the best foreign and domestic experience. It's about creating a national repository. This will allow all interested users to work with the large diversified databases, create the necessary arrays of bibliographic information, comparison of texts, use of the built-in scientific analytics system, determine the ratings of scientific institutions and scientists, obtain the information about the scientific developments of certain researchers and institutions (higher education institutions, scientific research institutes), as well as the relevance of their publications, the citation level of citation, etc.

In 2016, a decision to create a national repository of academic texts [17] was made. The Ministry of Education and Science of Ukraine established a working group of the central executive authorities representatives, employees of educational and scientific institutions, libraries, other specialists [18, 19]. The "road map" [20] was also approved and a medium-term action plan for the period until 2020 was proposed [21].

The final configuration of the national repository has not yet been determined. These issues are actively discussed among the specialists and the broad public, both on the official sites and in the social networks.

From our perspective, the national repository of academic texts is a universal national electronic database in which the national academic texts are accumulated, stored, systematized, undergo a comprehensive analysis and to which an unimpeded remote access of users is provided [22]. Accordingly, we treat the academic text as an author's scientific (scientific and technical, scientific and methodological, educational, etc.) work in the form of a peer-reviewed scientific work intended for dissemination, conforming to the requirements of the national standards, other regulatory documents on execution and technical performance.
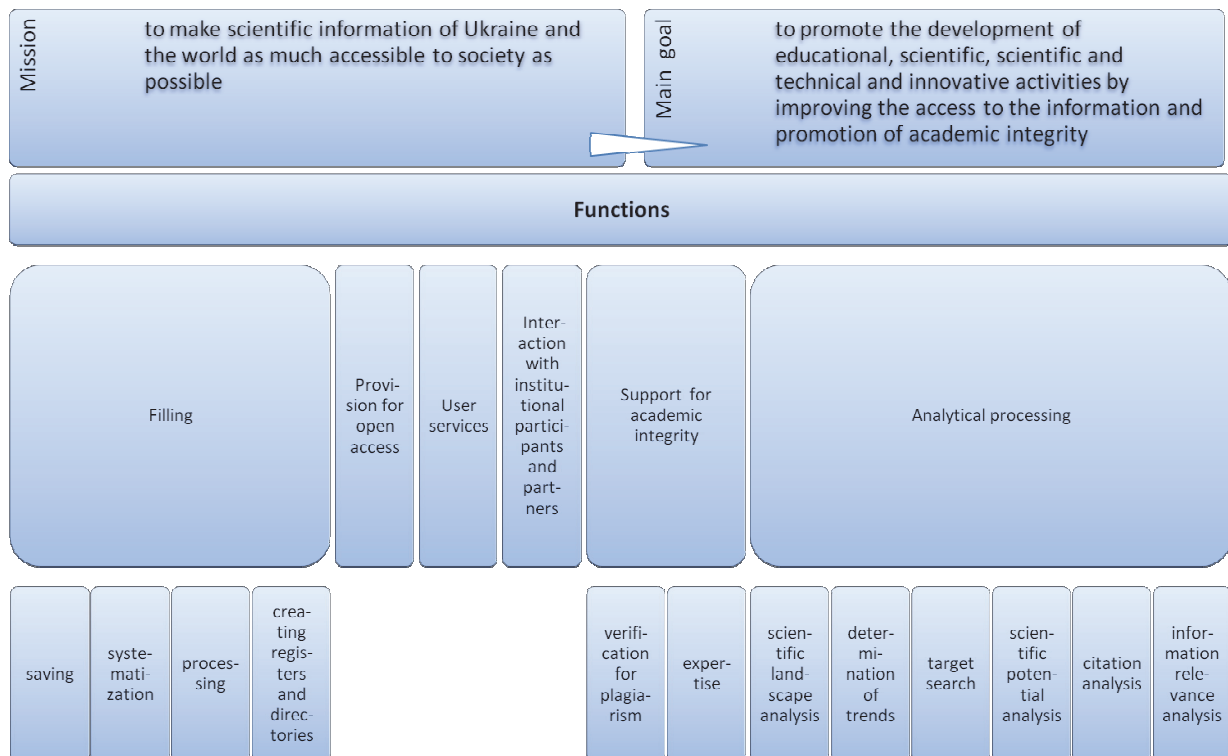

Figure 1. – Mission and main functionality of the national repository of academic texts

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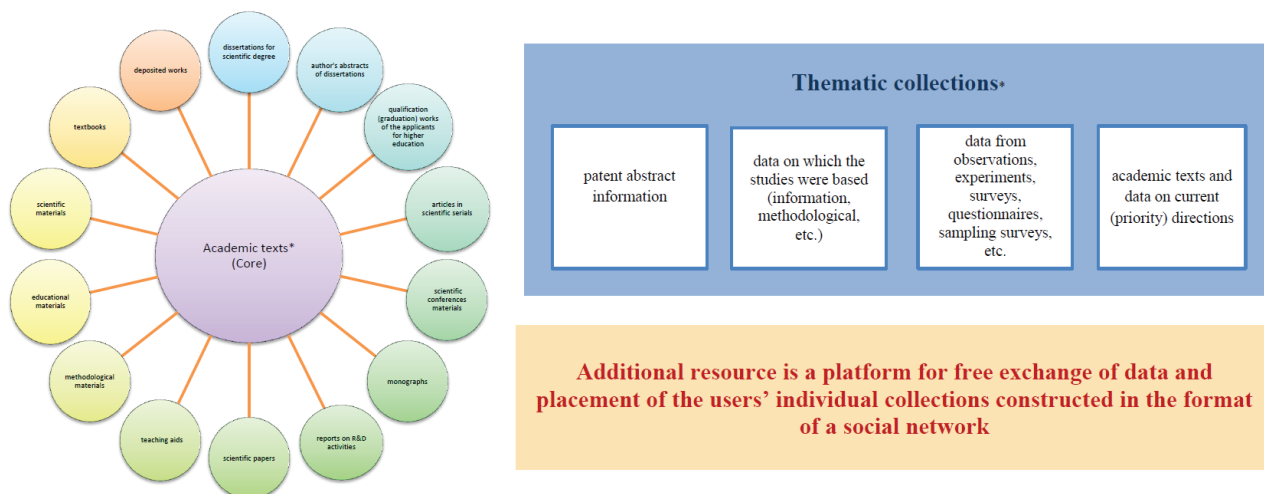
Figure 2. – The structure of the national academic texts repository

* - Verified resources

The main goal of the national repository is to promote the development of educational, scientific, scientific and technical and innovative activities by improving the access to the information and promoting the academic integrity. Its mission is to make the scientific information of Ukraine and the world as much accessible to society as possible (Fig. 1).

In accordance with this, the tasks of the national repository will be as follows:

− accumulation, storage, systematization and processing of academic texts and other scientific data published in Ukraine or originating in Ukraine in a digital format;

− information support for the education, science and innovation development;

− the most complete representation of the national academic texts in the world scientific and educational space;

− dissemination of academic texts and other scientific data and their provision to the interested users;

− development and implementation of a complex of analytical and applied tools for working with the academic texts and other scientific data; assessment of the national scientific landscape; support of academic integrity;

− contribution to the improvement of the research funding efficiency; formation of creative associations, etc.

The national repository, in our opinion, should consist of specially organized and structured academic texts, as well as other open data, and consist of:

− basic resources, including the core as a key central segment, thematic collections and databases,

− additional resources (Fig. 2).

It should be specially mentioned that it is referred to the open data, that is, the information having no restrictions for the disclosure (and therefore not containing the information that under the law is subject to protection from an unauthorized access) and presented in a format that allows its automated processing by electronic means, public and free access to it, its further use.

The core, the thematic collections and the scientific databases should contain only a verified open scientific, scientific and technical, scientific and educational information that originates from Ukraine or belongs to Ukrainian authors and comes to the repository from the institutional participants as a mandatory electronic copy.

The core is the key, central segment of the national repository which embraces the academic texts of various kinds. They are:

− qualification (graduation) works of the applicants for higher education;

− dissertations for scientific degree and author's abstracts of dissertations;

− articles in scientific serials;

− scientific publications (monographs, collections of scientific papers, scientific conferences materials);

− reports on research and development activities;

− deposited works which have passed the procedure of scientific review;

– textbooks, teaching aids and other scientific and methodological and educational materials.

Thematic collections and databases will accordingly complement the core of the national repository and accumulate the information intended for solving certain scientific, educational and innovative tasks coming from the institutional participants and official partners.

The data arrays of scientific research and large data can be placed in the national repository if their contents does not have limitations for public disclosure and open access. The users of this segment of the repository will be able to check the methodology and methods of the authors who published the results of their research, work with their databases, verify the authenticity, the validity and the correctness of the obtained results. When using this information the users must make the appropriate links and post the results of their own work with this data on the additional resources of the national repository in the public domain whether it is a computer processing, structuring, modelling, or analysis, etc.

The abstractive database of the patent information, we believe, will be compiled from the brief information that is open to public disclosure and non-commercial use, received from the institutional participants and the official partners.

Along with this, as a supplementary resource of the repository, a certain platform for free data exchange and placement of individual user collections created on the prototype of social networks can be formed. It can be filled by the registered users on their own initiative in the process of self-archiving in accordance with established procedures if this does not contradict the policy of the repository. Such a platform is inherently an element of the scientific and research infrastructure representing a collection of tools and means implemented on the Internet in the form of an interactive website intended for the informal exchange of scientific results (posting, discussion, review, publication, archiving, storage, provisioning in open access, distribution). This, we recall, will be a non-basic segment for the data verification of which the manager of the national repository should not be responsible.

The repository users are the legal entities and individuals who have passed the registration (authorization) procedure. The institutional participants are higher education institutions, scientific institutions, scientific publishers, organizations, libraries and others that will provide the academic texts and other

scientific data to the repository. Also, the repository will cooperate with the official partners which will provide the access to the other electronic archives, libraries, repositories, international abstractive and science-based databases, develop data-processing tools, etc.

The inclusion of academic texts and other scientific data in the core and thematic collections of the national repository is advisable to implement after the publishers, authors or right holders provide the appropriate consent and transmit of a digital/electronic copy that corresponds to a predefined format.

In order to provide the core and thematic collections of the repository with qualitative, reliable, verified information and maintain the comprehensive nature of the archive we propose to introduce the concept of "mandatory electronic copy" in analogy with the current procedure for the transfer of ordinary publications [23]. At the same time, the institutional participants who transfer the academic texts and other data to the national repository should be responsible for the authenticity, accuracy and completeness of the information provided.

The chronological framework for the academic texts and other data that are included in the national repository should not be established. This means that along with the process of filling the repository which will begin from the moment of its creation it can also receive the academic texts and other data stored in the archives of the institutional participants or the official partners.

The academic texts of the national repository can be divided by the access modes into open ones and those with the limited access. If under the contracts with the publishers the authors or the right holders do not provide the possibility of placing the full version of the work in the national repository, then its descriptive part (bibliography, abstract, content) is included in the open segment with the reference to the material storage resource, and (with the consent of the publisher, the author or the right holder) a separate fragment (part of the work) permitted for open access. The policy regarding such publications, qualifying graduate work of the applicants for higher education and other data should be flexible and consistently develop towards the maximum full openness. We believe that it is advisable to develop a discussion in the professional environment about the transfer of these materials to the closed part of the repository (conditionally designated as a "black box") which will allow not to lose them over time and make the most

effective use of analytical tools to identify plagiarism and study the scientific landscape.

The creation of the national repository is a large-scale project unique for Ukraine from the standpoint of the tasks to be solved, the scale and complexity of the solutions proposed. It provides for the concentration of diverse academic texts on the same platform with the unified technical and technological solutions for the accumulation, storage, systematization, search and comprehensive analysis of the scientific peer-reviewed scientific works created by the domestic authors and prepared in Ukraine.

The access to the repository through a single web platform will:

− allow to implement the multifunctionality of information search;

− simplify the access to full-text versions or their sources;

− allow for a comprehensive analysis, comparison and expertise;

− help in assessing the effectiveness of the national scientific and innovation system functioning;

− provide the effective (fast, targeted, without limitation by types of resources) information services for the managers of the budgetary funds;

− provide the users and the grantors with the access to a convenient database of research performed, their price, the results obtained, the implementation, etc.

The preliminary survey of the national scientific and informational environment and the consultations with the specialists who have an extensive experience in working with the relevant systems allows us to assert that the legal entities and individuals, higher education institutions, scientific institutions, scientific publishing houses, libraries, central executive bodies, authors, scientists, inventors, innovators, teachers, persons obtaining a higher education, etc. will become the users of the national repository. Their interest in the repository services will be caused by the needs of the professional activity and personal/professional development and will be realized during the training, in choosing the research directions, the identification of prospective partners, the formation of creative associations (collaborations), the mastering of new knowledge. Thus, the repository services will be used by those who need the access to a structured, topical, verified scientific information in order to increase their own knowledgeability, acquire the new competencies, expand the existing knowledge and practical implementation of the scientific research results. Instead of carrying out a search by the sputtered,

specifically arranged domestic databases they will obtain an access to the widest array of information through a single access point, the repository portal which will make search, analytical, educational and teaching activities more convenient and effective.

The functional capabilities of the national repository should provide users with the following:

− familiarization with the register of academic texts and other data that are included in the core and thematic collections;

− search for the data by a specific set of characteristics (simple, complex, professional);

− information on the availability of complete digital/electronic versions or fragments of academic texts and other data, as well as their availability for studying;

− providing the access to full-text versions or fragments of academic texts from the list formed on the basis of the results of individual search, the possibility of acquaintance with them (viewing);

− information storage in the personal electronic user account or on compatible external devices;

− information transfer/upload;

− processing and transformation of data into a certain format (chosen from the list provided by the national repository);

− correct citation according to the current or recognized standards;

− monitoring of data about browsing and uploading/storing information by the users;

− indexing;

− individual informing in accordance with the users' subscription (according to a set of the specified criteria) about the information on the receipt/updating of the academic texts and other data presented in the core and thematic collections of the repository;

− use of additional functionality in the form of specially developed analytical and other tools for working with the academic texts and other scientific data including the plagiarism testing, citation measuring, determining current directions and main trends in the research development, the scientific landscape assessment, tracking the implementation of scientific developments, etc.

The institutional members of the national repository independently transmit all the necessary information about the academic texts and other data and upload their digital versions generated in a specified (agreed) format, regularly update the data in accordance with the certain procedures and the metadata with the specially created application programming interface

using a personal electronic account for this purpose.

At the initial stage of the project implementation, it makes sense to rely on the model of distributed access to the systems effectively functioning and interested in supporting the national repository. Hereafter, it should be immediately filled with the scientific information resources directly from the sources (of the institutional participants) and the generated databases should be backed up, processed and integrated into a single "live" archive.

In our opinion, the repository should be constructed of the modules or subsystems structured by the types of academic texts, the degree of accessibility for familiarization and integration with the analytical tools.

The differentiated users' access to the repository can provide for several functional modes:

− multi-criteria structured multilevel bibliographic information search;

− full and partial/limited access to the content of academic texts;

− checking texts for plagiarism and the possibility of ordering the relevant expertise;

− system analysis of information on the publication activity, citing, research focus, its relevance to current priorities, the relevance for practice, the nature and the extent of implementation, etc.

In the future, there will be a need to establish a cooperation between the national repository and similar foreign structures. This will significantly expand the access of domestic scientists and practitioners to the developments of foreign researchers and will also make the Ukrainian scientific space more open to the outside world. Accordingly, there will be a gradual selective connection of a network of electronic libraries, storages, depositories and other resources where the valuable scientific information accumulates to the national repository.

When building the repository, it is necessary to take into account the models of systematization, storage of information and provision of remote access to the users developed by the various national institutions, as well as well-known design, software and hardware solutions that were used in similar foreign systems of repositories. They can be determined expertly relying on the best samples which will allow the use of the valid ratings.

Taking into account the considerable volumes of information, the high rate of their growth and the speed of the information technologies it is necessary to put the requirement of applying the most promising, progressive technologies, relevant methodological developments, technical solutions and standards into the project of creating a repository. This will allow the system to constantly develop and not become obsolete remaining a modern effective tool for supporting science, education and innovations.

The creation of the national repository of academic texts will be of considerable practical value since it will allow the unhindered rapid and effective access of scientists, teachers and innovators to the relevant and comprehensive structured scientific information. This will greatly simplify the analysis of existing national scientific and technical developments and their application in economic practice.

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Чмир О.С. Інституційне забезпечення відкритого доступу в Україні / Державна наукова установа «Український інститут науково-технічної експертизи та інформації»

Розглянуті питання організації відкритого доступу до наукової та освітньої інформації в Україні. Наведені приклади існуючих електронних архівів. Показана доцільність створення національного репозитарію академічних текстів. Подані пропозиції щодо ключових елементів майбутнього репозитарію – його структури, наповнення, взаємодії з учасниками, партнерами та користувачами, основні завдання та функції.

Ключові слова: відкритий доступ, наукова інформація, репозитарій, інфраструктура відкритої науки.